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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,819	09/16/2003	Hiroji Ebe	031171	1103
23850	7590	06/03/2005	EXAMINER	
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP 1725 K STREET, NW SUITE 1000 WASHINGTON, DC 20006			FARAHANI, DANA	
			ART UNIT	PAPER NUMBER
			2891	

DATE MAILED: 06/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

<b>Office Action Summary</b>	Application No. 10/662,819	Applicant(s) EBE ET AL.	
	Examiner Dana Farahani	Art Unit 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 February 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 6-8, 11, 12 and 14 is/are rejected.
- 7) ☒ Claim(s) 3-5, 9-10, 13, and 15-19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>09-14-2003</u> | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 2, 6, 7, 8, 11, 12, and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Mukai (US Patent 6,751,243), newly cited.

Regarding claims 1, 2, and 6, Mukai discloses in figure 3A, a quantum optical semiconductor device, comprising:  
a semiconductor substrate 1; and  
an active layer, the layers above the substrate, formed on the substrate, and including therein a quantum structure,  
the quantum structure comprising:

a first barrier layer 6 of a first semiconductor crystal having a first lattice constant and a first bandgap;

a second barrier layer 4 of a second semiconductor crystal formed epitaxially on said first barrier layer, said second semiconductor crystal having a second lattice constant and a second bandgap;

a plurality of quantum dots 2 formed in said second barrier layer, each of said quantum dots comprising a semiconductor crystal forming a strained system with regard to said first and second semiconductor crystals and having a lattice constant different from said first lattice constant and a bandgap smaller than any of said first and second bandgaps, each of said quantum dots having a height substantially identical with a thickness of said second barrier layer; and

a third barrier layer 3 of a third semiconductor crystal formed on said second barrier layer, said third semiconductor crystal having a lattice constant different from said lattice constant of said semiconductor crystal constituting said quantum dot, said third semiconductor crystal further having a third bandgap larger than said bandgap of said semiconductor crystal forming said quantum dot,

said third barrier layer making a contact with an apex of said quantum dot formed in said second barrier layer, as can be seen in the figure.

Regarding claim 7, the first and third semiconductor layers have an identical composition (they are both GaAs).

Regarding claim 8, the second lattice constant is larger or smaller than any of the first and third lattice constants.

Regarding claim 11, the substrate is GaAs.

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Regarding claim 12, the semiconductor substrate carries a first electrode 42, a first cladding layer 31 being provided between said semiconductor substrate and said active layer, and a second electrode 38 is provided on said active layer via a second cladding layer 37 (see figure 4).

Regarding claim 14, Mukai discloses in figure 3A, a semiconductor substrate 1, and an active layer, the layers above the substrate, formed on said semiconductor substrate and including a quantum structure therein,

said quantum structure comprising:

a first barrier layer 3 of a first semiconductor crystal having a first lattice constant and a first bandgap;

a second barrier layer 4 of a second semiconductor crystal formed epitaxially on said first barrier layer, said second semiconductor crystal having a second lattice constant and a second bandgap;

a plurality of quantum dots 2 formed in said second barrier layer, each of said quantum dots comprising a semiconductor crystal forming a strained system with respect to said first and second semiconductor crystals and having a lattice constant different from said first lattice constant and a bandgap smaller than any of said first and second bandgaps (the dots are made of InGaAs having a bandgap of 2.16. GaAs layer 3 and AlAs layer 4 have bandgaps of 1.42 and 2.16, respectively), each of said quantum dots having a height substantially equal to a thickness of said second barrier layer, as can be seen in the figure,

said first barrier layer and said second barrier layer being stacked alternately such that

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said first barrier layer makes a contact with an apex of said quantum dot in said second barrier layer,

said first barrier layer and said second barrier layer having respective, different compositions.

*Allowable Subject Matter*

3. Claims 3-5, 9-10, 13, and 15 -19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Response to Arguments*

4. Applicant's arguments with respect to the previously rejected claims have been considered but are moot in view of the new ground(s) of rejection.


*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dana Farahani whose telephone number is (571)272-1706. The examiner can normally be reached on M-F 9:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571)272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

D. Farahani



**B. WILLIAM BAUMEISTER  
SUPERVISORY PATENT EXAMINER**